

Claims:

What is claimed is:

1. A method for measuring the acid etch effect of acid rain on a coated substrate, the method comprising:
 - a) providing a painted substrate to be tested;
 - b) placing the substrate in a substantially horizontal position of less than 15°C to the horizontal,
 - c) applying an acid solution to the coated substrate;
 - d) exposing the panel having acid solution thereon to a heat source,
 - e) exposing the panel having acid solution thereon to an artificial light source emitting light in the spectral power distribution of at least ultraviolet and visible light, wherein the exposure to heat and light may be sequential, where either heat or light exposure may occur first or exposure may be simultaneous, and
 - f) following exposure to heat and light, evaluating the substrate for acid etch damage.
2. A method according to claim 1 wherein the substrate is subjected to a heat source independently of a light source.
3. A method according to claim 2 wherein the substrate is subjected to heat from one device and light from a second device.
4. A method according to claim 1 wherein the substrate is subjected to heat and light simultaneously.
5. A method according to claim 1 wherein the substrate is exposed to heat and light in a single enclosed device.
6. A method according to claim 2 wherein exposure to heat and light is within a single enclosed device.

7. A method according to claim 4 wherein exposure to heat and light is within a single enclosed device.
8. A method according to claim 1 wherein exposure to heat and light is conducted over a period of between 4 and 48 hours.
9. A method according to claim 1 wherein the acid solution has a pH between 2.0 and 4.5.
10. A method according to claim 1 wherein the acid used in the acid solution is selected from the group consisting of hydrochloric, sulfuric, nitric and formic acids and mixtures thereof.
11. A method according to claim 1 wherein the light source is a xenon lamp.
12. A method according to claim 1 wherein the coated panel is exposed to heat and light for over a period of 24 hours.
13. A method according to claim 1 wherein the heat source maintains the substrate at a temperature range of between 40°C and 90°C.
14. A method according to claim 1 wherein the test further comprises exposing the substrate to relative humidity between 70% and 90%.
15. A method according to claim 1 wherein the acid solution volume applied to a substrate in 24 hours is between 200 and 1000 cc.
16. A method according to claim 1 wherein the substrate is contacted with a mist of clean water and exposed to darkness following exposure to light and heat.

17. A method according to claim 1 wherein the substrate is exposed to a light source for up to 12 hours at a black panel temperature above 40°C.
18. A method according to claim 1 comprising the following steps conducted over a time period of 4 to 48 hours:
- (a) applying a spray of an acid solution to a painted substrate;
 - (b) exposing the coated substrate to temperatures between 40°C and 90°C and to light from the light source, for a time between 8 and 20 hours.
19. The method of claim 18 further comprising subsequent to steps a) and b),
- c) applying a spray of water to a test panel at a panel temperature between 20°C and 50°C for a time between 1 and 20 minutes;
 - d) subsequent to step c) exposing the test panel to darkness at a temperature between 20° and 50°C for up to 16 hours.
20. The method of claim 19 wherein the light cycles and the dark cycles are each repeated 3 times.
21. The method of claim 18 further comprising exposing a test panel to light and heat at a relative humidity between 70 and 90%.
22. The method of claim 18 wherein the test cycles are conducted for a total test period of 400 hours.
23. The method of claim 18 wherein the light source is a xenon lamp.
24. The method of claim 1 wherein the substrates tested according to the test method and provide test results correlating within one point to test results for substrates tested in outdoor exposure testing, when evaluated on the GM Rating Scale.

25. A method for measuring the acid etch effect of acid rain on a coated substrate, the method comprising:
- a) providing a painted substrate to be tested;
 - b) providing an accelerated weathering apparatus comprising a test chamber having
 - i) a support member for supporting the substrate which is to be tested in a substantially horizontal position of less than 15° to the horizontal,
 - ii) a heat source,
 - iii) a light source emitting at least ultraviolet and visible light having the spectral distribution of sunlight;
 - c) placing the test panel in the weathering apparatus in a substantially horizontal position;
 - c) applying an acid solution by spraying, dipping or in atomized droplets provided by any means, to the coated substrate while the substrate is in a substantially horizontal position;
 - d) exposing the substrate within the weathering apparatus to artificial light having a spectral power distribution including ultraviolet and visible light at temperature above 30°C;
 - (e) following completion of exposure, evaluating the substrate for acid etch damage.
26. A method according to claim 25 further comprising exposing the substrate to darkness at a temperatures above 30°C.
27. A method according to claim 25 further comprising exposing the substrate to cycles of light and darkness at a relative humidity between 70 and 99%.
28. A method according to claim 25 wherein the light source is a xenon lamp.